

Specification

The abstract of the disclosure is objected to because it is unclear what is meant by the phrase “in the range of > A/dm²” in line 6. Correction is required. See MPEP § 608.01(b).

Claim Objections

Claim 35 is objected to because of the following informalities:

Claim 35

line 4, a -- : -- (colon) should be inserted after “Mn²⁺”.

line 6, a -- : -- (colon) should be inserted after “NO₃⁻”.

line 6, a -- . -- (period) should be inserted after the range “1-10 g/l”.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

- I. Claims 21-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21

line 2, it is unclear how the phosphating layer is electrolytically deposited from the acid aqueous solutions (plural). For example, Applicants' Fig. shows one electrolyte 13.

line 5, it appears that "an electrolyte" is the same as the acid aqueous solutions recited in claim 21, line 2. However, the claim language is unclear as to whether it is.

line 5, it appears that "a current density greater than -5 A/dm²" is further limiting the direct current recited in claim 21, line 3. However, the claim language is unclear as to whether it is.

Claim 23

line 2, the phrase "is preferably between 40 and 80°C" is indefinite.

line 2, the phrase "especially between 60 and 70°C" is indefinite.

Claim 24

line 2, the phrase "especially in the range of 5-50 g/l" is indefinite.

line 3, the phrase "especially in the range of 10-80 g/l" is indefinite.

Claim 25

line 3, it appears that “a phosphating layer” is the same as the phosphating layer recited in claim 21, line 2. However, the claim language is unclear as to whether it is. If it is, then it is suggested that the word “a” be amended to the word -- the --.

Claim 28

line 2, the alternative expression of the Markush group is improper (MPEP § 2173.05(h)). The words “made up” should be amended to the word -- consisting --, and the word -- and -- should be inserted after the element “Cu.”.

Claim 29

line 2, the alternative expression of the Markush group is improper (MPEP § 2173.05(h)). The words “made up” should be amended to the word -- consisting --, and the word -- and -- should be inserted after the element “Ni.”.

Claim 30

line 2, the phrase “preferably between approximately 2.5 and approximately 3.5” is indefinite.

Claim 32

line 2, the alternative expression of the Markush group is improper (MPEP §

2173.05(h)). The words “made up” should be amended to the word -- consisting --, and the word “or” should be amended to the word -- and -- in line 3.

Claim 33

lines 1-2, recite “wherein the metal ions of the divalent metal M are supplied by anodic dissolution of the electrolyte.”

It is unclear how the metal ions of the divalent metal M are supplied by anodic dissolution **of the electrolyte** when the additional ions are **in the acid aqueous solutions** as recited in parent claim 25, lines 1-2.

Claim 36

line 1, “the electrolysis” lacks antecedent basis.

line 2, “the two components” lack antecedent basis.

Claim 37

line 2, “the local current density” lacks antecedent basis.

Claim 38

line 1, it appears that “a direct current” is the same as the direct current recited in claim 21, line 3. However, the claim language is unclear as to whether it is.

Claim 39

line 1, “the speed” lacks antecedent basis.

line 1, “the layer formation” lacks antecedent basis.

II. Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the metal layers and the phosphating layer.

Claim 29

lines 1-2, recite “wherein the **metal layers** are selected from the group made up of stainless steel, bronze, Al, Al alloys, Cu, Cu alloys, Ni, Ni alloys.”

This claim limitation is further limiting the preamble of claim 21, line 1. There is no relationship recited in the body of the claim between the metal layers and the phosphating layer, or even the phosphating of the metal layers.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public

use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Product

I. Claim **40** is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Freeman et al.** (US Patent No. 3,449,222) [Freeman I].

Freeman I teaches a metal layer, comprising:

a porous zinc phosphate layer, wherein pores of the zinc phosphate layer are filled with metallic zinc and/or zinc alloy (= metallic zinc deposited on the zinc phosphate coated surface, the amount of zinc deposited being at least sufficient to fill any pores in the zinc phosphate coating) [col. 2, line 49 to col. 3, line 2; and col. 8, claim 7].

II. Claim **40** is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Freeman et al.** (US Patent No. 3,449,229) [Freeman II].

Freeman II teaches a metal layer, comprising:

a porous zinc phosphate layer, wherein pores of the zinc phosphate layer are filled with metallic zinc and/or zinc alloy (= metallic zinc is deposited into the pores of the

phosphate coating from a zinc plating bath) [col. 2, lines 45-52; and col. 6, claim 3].

III. Claim 40 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Mori et al.** (US Patent No.4,904,544).

Mori teaches a metal layer, comprising:

a porous zinc phosphate layer, wherein pores of the zinc phosphate layer are filled with metallic zinc and/or zinc alloy (= the Zn²⁺ are trapped in the minute pores to form a protective coating) [col. 6, lines 27-33].

IV. Claim 40 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **WO 91/19836** ('836).

WO '836 teaches a metal layer, comprising:

a porous zinc phosphate layer, wherein pores of the zinc phosphate layer are filled with metallic zinc and/or zinc alloy (= deposition of metallic zinc) [page 7, lines 19-20; and page 10, Table 1, "deposition of metallic zinc", Bath compositions F and I].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Method

I. Claims **21-25, 27-28, 30-34, 37 and 39** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Freeman et al.** (US Patent No. 3,449,229) [Freeman II] in combination with **Amundsen** (US Patent No. 2,540,314).

Freeman II teaches a method for phosphating metal layers, comprising:

(a) electrolytically depositing a phosphating layer (= forming a zinc phosphate coating) from acid aqueous solutions which contain at least zinc ions and phosphate ions (col. 3, lines 10-23), while simultaneously applying direct current (= a conventional zinc phosphate coating bath while passing an electric current through the bath) [col. 2, lines 30-40; and col. 6, claim 3]; and

(b) simultaneously with the depositing of the phosphating layer, electrolytically depositing zinc in an electrolyte (= the simultaneous deposition of zinc in pores of the phosphate coating) [col. 2, lines 45-52] in accordance with a current density (= not substantially in excess of about 30 A/ft²) [col. 3, lines 66-71].

A temperature amounts to >40°C and is preferably between 40 and 80°C, especially between 60 and 70°C (= the solution temperatures are not in excess of about 85°C) [col. 3, lines 63-66].

The electrolyte contains zinc ions in the range of >5 g/l, especially in the range of 5-50 g/l (col. 3, lines 30-33) [Amundsen, cols. 5-6, Table 1: 20, 30 and 40 g/l ZnCl₂], and phosphate ions in the range of >10 g/l, especially in the range of 10-80 g/l (= 48 parts by weight H₃PO₄) [Amundsen, cols. 5-7, Examples].

Wherein the acid aqueous solutions additionally contain ions of elements that are able to form an alloy with zinc, so that when there is a deposit of a phosphating layer, a deposit of zinc and/or zinc alloys takes place simultaneously (= other modifying ions may also be present in the solution, such as ferrous ions, nickel ions, copper ions, alkaline earth metal ions, such as calcium, and the like) [col. 3, lines 20-23].

The additional ions are the ions of a divalent metal M (= other modifying ions may also be present in the solution, such as ferrous ions, nickel ions, copper ions, alkaline earth metal ions, such as calcium, and the like) [col. 3, lines 20-23].

The additional divalent metal M is selected from the group made up of Ni, Fe, Co, Cu, Mn (= other modifying ions may also be present in the solution, such as ferrous ions, nickel ions, copper ions, alkaline earth metal ions, such as calcium, and the like) [col. 3, lines 20-23].

The pH value of the electrolyte lies between approximately 1.5 and approximately 4, preferably between approximately 2.5 and approximately 3.5 (= the pH of these solutions should exceed 2.2, preferably between 2.2 and 3.0) [col. 3, lines 30-33] (Amundsen, col. 4, lines 65-75).

The method further comprises adding an accelerator to the electrolyte (= these solutions may also contain an accelerator or oxidizing agent, such as nitrate ions, nitrite ions, chlorate ions, peroxide ions, and the like, as are well known in the art) [col. 3, lines 17-20].

The accelerator is selected from the group made up of urea, nitrate, nitrite,

chlorate, bromate, hydrogen peroxide, ozone, organic nitro bodies, peroxy compounds, hydroxylamine or mixtures thereof (= these solutions may also contain an accelerator or oxidizing agent, such as nitrate ions, nitrite ions, chlorate ions, peroxide ions, and the like, as are well known in the art) [col. 3, lines 17-20].

The metal ions of the divalent metal M are supplied by anodic dissolution of the electrolyte (= *inherent* in the electrolyzing) [col. 3, lines 59-71].

The method further comprises adding Zn, Ni, Co and/or Mn salts to the electrolyte (= other modifying ions may also be present in the solution, such as ferrous ions, nickel ions, copper ions, alkaline earth metal ions, such as calcium, and the like) [col. 3, lines 20-23].

Wherein a layer thickness distribution on the metal layers is regulated by the local current density (= is proportional to current density) [col. 3, lines 66-71].

Wherein the speed of the layer formation lies in the range of approximately 3 to approximately 20 $\mu\text{m}/\text{min}$ (= is proportional to current density) [col. 3, lines 66-71].

The method of Freeman II differs from the instant invention because Freeman II does not disclose the following:

- a. Wherein the current density is greater than -5 A/dm^2 , as recited in claim 21.
- b. Wherein the current density is in the range of -5 to -50 A/dm^2 , as recited in claim 22.

Freeman II teaches the current densities utilized in this simultaneous deposition of zinc and zinc phosphate are not substantially in excess of about 30 A/ft² (= about 3.22 A/dm²) [col. 3, lines 66-71].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the current density described by Freeman II with wherein the current density is greater than -5 A/dm²; and wherein the current density is in the range of -5 to -50 A/dm² because a *prima facie* case of obviousness exists where claimed ranges and prior art ranges do not overlap but are close enough (i.e., a difference of 1.78 A/dm²) that one skilled in the art would have expected them to have the same properties (MPEP § 2144.05(I)).

Furthermore, the word “about” in “about 30 A/ft²” permits some tolerance or flexibility. *In re Ayers* 69 USPQ 109 and *In re Erickson* 145 USPQ 207 and MPEP § 2173.05(b)(A).

II. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Freeman et al.** (US Patent No. 3,449,229) [Freeman II] in combination with **Amundsen** (US Patent No. 2,540,314) as applied to claims 21-25, 27-28, 30-34, 37 and 39 above, and further in view of **Endo et al.** (US Patent No. 5,232,523).

Freeman II and Amundsen are as applied above and incorporated herein.

The method of Freeman II differs from the instant invention because Freeman II does not disclose wherein instead of the ions, nanoparticles or organic molecules are

used, as recited in claim 26.

Freeman II teaches that wherein the zinc enriched zinc phosphate coating is formed by the electrodeposition of zinc onto the zinc phosphate coating formed on the metal surface, any of the conventional zinc plating bath may be used. As are known in the art, these baths contain various soluble salts zinc salts, such as sulfates, chlorides, cyanides, oxides, and the like. Additionally, as is known in the art, these plating baths may also contain other adjuvants for improving or enhancing the quality of the metallic zinc plate which is produced (col. 3, line 72 to col. 4, line 23).

Like Freeman II, Endo teaches phosphate coatings for metal surfaces. Endo teaches that in the phosphate solution are colloidal particles having an isoelectric point of 3 or less and an average particle diameter of 0.1 μ or less (col. 4, lines 3-12). The colloidal particles include acrylic resin particles (col. 5, lines 3-4).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the ions described by Freeman II with wherein instead of the ions, nanoparticles or organic molecules are used because a phosphate film with excellent corrosion resistance, hot brine resistance and adhesion properties would have been formed on an iron-based surface or a metal surface containing both an iron-based surface and a zinc-based surface as taught by Endo (col. 5, lines 3-4; col. 6, lines 49-59; and col. 10, Table 1).

III. Claims 29, 35-36 and 38 are rejected under 35 U.S.C. 103(a) as being

unpatentable over **Freeman et al.** (US Patent No. 3,449,229) [Freeman II] in combination with **Amundsen** (US Patent No. 2,540,314) as applied to claims 21-25, 27-28, 30-34, 37 and 39 above, and further in view of **Matsuda** (US Patent No. 5,645,706).

Freeman II and Amundsen are as applied above and incorporated herein.

The method of Freeman II differs from the instant invention because Freeman II does not disclose the following:

a. Wherein the metal layers are selected from the group made up of stainless steel, bronze, Al, Al alloys, Cu, Cu alloys, Ni, Ni alloys, as recited in claim 29.

Freeman teaches forming protective coatings on ferrous metals (col. 3, lines 10-12). Freeman teaches steel panels (col. 5, lines 1 and 32).

Like Freeman, Matsuda teaches forming protective coatings on ferrous metals. Matsuda teaches steel, stainless steel, magnetic materials, aluminum, copper, and the like (col. 4, lines 4-5; col. 7, lines 17-18 and 30-36; and cols. 17-18, Table 2, "Material to be treated").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the metal layer described by Freeman II with wherein the metal layers are selected from the group made up of stainless steel, bronze, Al, Al alloys, Cu, Cu alloys, Ni, Ni alloys because steel and stainless steel are common metal materials for phosphate chemical treatment methods as taught by Matsuda (col. 4, lines 4-5; col. 7, lines 17-18 and 30-36; and cols. 17-18, Table 2, "Material to be treated").

It has been held that the selection of a known material based on its suitability for its intended use supports *a prima facie* obviousness determination (MPEP § 2144.06 and § 2144.07).

b. Wherein the electrolysis is performed either in a potentiostatic or a galvanostatic manner or a mixture of the two components, as recited in claim 36.

c. Wherein a direct current is pulsed, as recited in claim 38.

Matsuda teaches a constant voltage electrolysis including pulse electrolysis (col. 12, lines 17-18). The electrolytic treatment results in the production of less sludge than in the case of non-electrolytic baths (col. 12, line 56 to col. 13, line 7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolysis described by Freeman II with wherein the electrolysis is performed either in a potentiostatic or a galvanostatic manner or a mixture of the two components; and wherein a direct current is pulsed because this would have resulted in the production of less sludge than in the case of non-electrolytic baths as taught by Matsuda (col. 12, line 56 to col. 13, line 7).

d. Wherein the electrolyte has the following composition:

Zn²⁺: 5-40 g/l

M²⁺: 0.5-10 g/l

H₂PO₄⁻: 10-40 g/l and

NO_3^- : 1-10 g/l,

as recited in claim 35.

Freeman teaches that although the specific concentration of the phosphate coating solutions used will depend on the type of coatings desired and the specific operating conditions utilized, in general it has been found to be desirable that the solutions used contain from about 0.5 to 3 % by weight of phosphate (PO_4) and a free phosphoric acid content within the range of about 0.3 to about 0.8 %. Additionally, the accelerators and modifying ions are typically present in amounts within the range of about 0.0001 to about 5 % by weight of the solution, depending upon the particular ions added and the nature of the coating which is desired (col. 3, lines 30-45).

Amundsen teaches:

ZnO : 11 parts by weight

H_3PO_4 : 48 parts by weight

ZnCl_2 : 6 parts by weight

FeCl_2 : 5 parts by weight

Water to balance 30 parts by weight (col. 5, Example 1).

Matsuda teaches that the chemical film treatment bath preferably contains about 4 g/l or more of phosphate ion; about 1.5 g/l or more of the film-forming metal ion; and about 3 g/l or more of nitrate ion (col. 14, lines 6-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolyte described by Freeman with

wherein the electrolyte has the following composition: 5-40 g/l of Zn^{2+} ; 0.5-10 g/l of M^{2+} ; 10-40 g/l of $H_2PO_4^-$; and 1-10 g/l of NO_3^- because the concentrations are result-effective variables and one skilled in the art has the skill to calculate the concentration that would have determined the success of the desired reaction to occur, e.g., depended on the type of coatings desired and the specific operating conditions utilized (MPEP § 2141.03 and § 2144.05(II)(B)).

Furthermore, it has been held that changes in temperature, concentration or both, is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed “critical” ranges and Applicant has the burden of proving such criticality; even though Applicant’s modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) and MPEP § 2144.05.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDNA WONG whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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